

Notice of Allowability

Application No.

10/777,967

Examiner

Paul W. Schlie

Applicant(s)

PLISS ET AL.

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to an examiner initiated interview and resulting further amended claims dated 6/6/06.
2. ☒ The allowed claim(s) is/are 1-12, 14-20 and 22-34.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

- | | |
|---------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 1. <input type="checkbox"/> Notice of References Cited (PTO-892) | 5. <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 6. <input type="checkbox"/> Interview Summary (PTO-413), Paper No./Mail Date _____ |
| 3. <input type="checkbox"/> Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date _____ | 7. <input checked="" type="checkbox"/> Examiner's Amendment/Comment |
| 4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit of Biological Material | 8. <input type="checkbox"/> Examiner's Statement of Reasons for Allowance |
| | 9. <input type="checkbox"/> Other _____ |

EXAMINER'S AMENDMENT

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

2. Previously received amended drawings, specification, and claims dated 5/16/06 have been accepted.

3. Authorization for this examiner's amendment was given in a telephone interview with Daniel Vaughan on 6/6/06; whereby:

The specification is amended; and

Claims 13 and 21 are canceled; and

Claims 1-3, 8-11, 14, 20, 22, 24, 28-30 are further amended;

Claims 4-7, 12, 15-19, 23, 25-27 and 31-34 remain as originally presented or as otherwise most recently amended.

4. The last paragraph of the specification on page 11 lines 5-18 has been amended as follows:

It should also be understood that the techniques of the present invention may be implemented using a variety of technologies. For example, the methods described herein may be implemented in software executing on a computer system, or implemented in hardware utilizing either a combination of microprocessors or other specially designed application specific integrated circuits, programmable logic devices, or various combinations thereof. In particular, the methods described herein may be implemented by a series of computer-executable instructions residing on a suitable computer-readable medium. Suitable computer-

readable media may include volatile (e.g., RAM and/or non-volatile (e.g., ROM, disk) memory), ~~carrier waves and transmission media (e.g., copper wire, coaxial cable, fiber optic media).~~ Exemplary carrier waves may take the form of electrical, electromagnetic or optical signals conveying digital data streams along a local network, a publicly accessible network such as the Internet or some other communication link.

5. The application has been amended as follows:

1. (Currently Amended) A [[computer-implemented]] method of performing generational garbage collection on a memory using a dynamic slidable window, the method comprising:

receiving an indication that allocated data within the memory should be temporarily inhibited from being promoted from a young generation to an old generation;

identifying a position in said memory at which a set of data expected to become garbage within a finite period of time is to be stored; fixing a lower bound of a slidable window at said position, wherein said window is configured to identify the [[a]] young generation and said position indicates a boundary between the young generation and the old generation within the memory;

allowing an upper bound of said window to dynamically expand while said lower bound is fixed for a period of time exceeding that which it would have remained fixed if said indication had not been received; and

after the set of data becomes garbage:

un-fixing said lower bound; and

~~decreasing a size of said window~~

resuming promotion of allocated data from the young generation to the old generation.

2. (Currently Amended) The method of claim 1, wherein said receiving comprises further comprising, prior to said identifying:

receiving an alert from an entity configured to have knowledge of a nature of the set of data.

3. (Currently Amended) The method of claim 1, wherein said receiving comprises further comprising, prior to said identifying:

receiving notification that the set of data is to be stored in said memory.

4. (Original) The method of claim 3, wherein said identifying comprises:

identifying a location of an allocation point in said memory at the time said notification is received.

5. (Original) The method of claim 1, wherein the size of said window grows as said upper bound dynamically expands.

6. (Original) The method of claim 1, further comprising, after the set of data becomes garbage:

garbage-collecting the young generation.

7. (Original) The method of claim 1, further comprising, prior to said fixing:

garbage-collecting the young generation.

8. (Currently Amended) The method of claim 1, further comprising, after the set of data becomes garbage wherein said decreasing comprises:

decreasing ~~setting~~ the size of the window to a predetermined size.

9. (Currently Amended) The method of claim 1, wherein:
during allocation of said memory prior to said fixing:
data are promoted from the young generation to the old generation;
said lower bound and said upper bound are configured to slide simultaneously; and
the window maintains an unchanging size; and
during allocation of said memory after said fixing:
said lower bound does not slide;
said upper bound expands; and
the window dynamically changes size.
10. (Currently Amended) A computer readable storage medium storing instructions that, when executed by a computer, cause the computer to perform a method of performing generational garbage collection on a memory using a dynamic slidable window, the method comprising:
receiving an indication that allocated data within the memory should be temporarily inhibited from being promoted from a young generation to an old generation;
identifying a position in said memory at which a set of data expected to become garbage within a finite period of time is to be stored;
fixing a lower bound of a slidable window at said position, wherein said window is configured to identify the [[a]] young generation and said position indicates a boundary between the young generation and the old generation within the memory;
allowing an upper bound of said window to dynamically expand while said lower bound is fixed for a period of time exceeding that which it would have remained fixed if said indication had not been received; and
after the set of data becomes garbage:

un-fixing said lower bound; and
~~decreasing a size of said window~~
resuming promotion of allocated data from the young
generation to the old generation.

11. (Currently Amended) A method of generational garbage collection using a dynamic window, the method comprising:

in a generational garbage-collected memory, defining a young generation with a slidable window having a lower bound and an upper bound;

receiving a first indication that promotion of allocated data from the young generation to an old generation should be temporarily inhibited;

~~receiving a first notification regarding storage, in the memory, of data expected to become garbage in a relatively short period of time;~~

fixing said lower bound in a position denoting a boundary between the young generation and an old generation for a longer period of time than the boundary would have been fixed if said indication had not been received; and

while said lower bound is fixed in said position:

~~allowing said upper bound to expand while said lower bound is fixed in said position;~~ and

preventing promotion from the young generation to the old generation.

12. (Original) The method of claim 11, further comprising, after said relatively short period of time allowing:

garbage-collecting the young generation; and
un-fixing said lower bound.

13. (Cancelled)

14. (Currently Amended) The method of claim 11, further comprising, after said allowing:

receiving a second indication ~~notification~~ that said data have become garbage.

15. (Previously Amended) The method of claim 11, further comprising, after said allowing:

observing the passage of a predetermined period of time.

16. (Original) The method of claim 11, wherein said allowing comprises:

incrementing said upper bound while said lower bound is fixed in said position.

17. (Previously Amended) The method of claim 11, wherein said fixing comprises:

identifying a position in the memory at which said data are to be stored; and

setting said lower bound at the identified position.

18. (Previously Amended) The method of claim 11, wherein said fixing comprises:

identifying a position in the memory where said data are stored;
and

setting said lower bound at the identified position.

19. (Previously Amended) The method of claim 11, wherein said fixing comprises:

determining that said data will be stored in the memory;

wherein said position is the position at which said data are or will be stored.

20. (Currently Amended) A computer readable storage medium storing instructions that, when executed by a computer, cause the computer to perform a method of generational garbage collection using a dynamic window, the method comprising:

in a generational garbage-collected memory, defining a young generation with a slidable window having a lower bound and an upper bound;

receiving a first indication that promotion of allocated data from the young generation to an old generation should be temporarily inhibited;
~~receiving a first notification regarding storage, in the memory, of data~~
expected to become garbage in a relatively short period of time;

fixing said lower bound in a position denoting a boundary between the young generation and an old generation for a longer period of time than the boundary would have been fixed if said indication had not been received; and

while said lower bound is fixed in said position:

~~allowing said upper bound to expand while said lower bound is fixed in said position;~~ and

preventing promotion from the young generation to the old generation.

21. (Cancelled)

22. (Currently Amended) An apparatus for performing generational garbage collection, comprising:

a memory having an old generation and a young generation;

a slidable window for defining said young generation, said slidable

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window comprising:

a lower bound configured to be fixed in a selectable position during a temporary phase of allocation of the memory but slidable during a normal phase of allocation of the memory, said position identifying a boundary between said young generation and said old generation; and

an upper bound configured to slide during said temporary phase and said normal phase;

a garbage collector configured to perform garbage collection on one or more of said old generation and said young generation; and

a memory allocator configured to:

allocate the memory in said normal phase when said lower bound and said upper bound slide simultaneously, thereby continuously defining a different portion of the memory as said young generation during said normal phase; and

in response to an indication that promotion of allocated data from said young generation to said old generation should be temporarily inhibited:

fix said lower bound, at a position identifying a boundary between said young generation and said old generation, for longer period of time than said lower bound would remain at said position in said normal phase; and

allocate the memory in said temporary phase while ~~when said lower bound is fixed~~, thereby continuously increasing the size of the young generation defined by said slidable window during said temporary phase;

wherein during said normal phase data are promoted from said young generation to said old generation; and

wherein during said temporary phase promotion of data from said young generation to said old generation is inhibited.

23. (Previously Amended) The apparatus of claim 22, wherein:
said slidable window maintains an unchanging size while said
memory allocator allocates memory in said normal phase; and
said slidable window expands in size while said memory allocator
allocates memory in said temporary phase.

24. (Currently Amended) The apparatus of claim 22, wherein said
indicator indicates that apparatus is configured to fix said lower bound and
~~allocate memory in said temporary phase when a set of data stored in said~~
~~memory is expected to become garbage within a finite period of time.~~

25. (Previously Amended) The apparatus of claim 24, wherein said
apparatus is configured to un-fix said lower bound and allocate memory in
said normal phase after said set of data becomes garbage.

26. (Original) The apparatus of claim 24, wherein said selectable
position is a position at which the set of data is stored.

27. (Original) The apparatus of claim 24, wherein said selectable
position is a position at which the set of data will be stored.

28. (Currently Amended) An electronic device, comprising:
a processor;
a garbage-collectable memory having:
an old generation of memory; and
a young generation of memory defined by a slidable window having
a lower bound and an upper bound;
a garbage collector for controlling garbage-collection of said memory;
executable code configured to:

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issue a first indication to said garbage collector when promotion of allocated data from said young generation to said old generation should be temporarily inhibited;

issue a second indication to said garbage collector when a set of data stored in said memory has become garbage;

~~alert said garbage collector a first time when data to be stored in said memory are expected to become garbage in a relatively short period of time; and~~

~~alert said garbage collector a second time when said data have become garbage;~~

wherein, in response to said first indication ~~alert~~[[,]]:

said lower bound is fixed in a position denoting a boundary between said young generation and said old generation for a longer period of time than said lower bound would have been fixed if said first indication had not been received;

~~and said upper bound is allowed to expand; and~~

promotion of data from said young generation to said old generation is inhibited; and

wherein, in response to said second indication ~~alert~~[[,]]:

said lower bound is un-fixed; and

promotion of data from said young generation to said old generation is resumed.

29. (Currently Amended) The electronic device of claim 28, wherein, in response to said second indication ~~alert~~, said upper bound is retracted to return said slidable window to its size prior to said first indication ~~alert~~.

30. (Currently Amended) The electronic device of claim 28, wherein, in response to said second indication ~~alert~~, said garbage collector garbage-collects said young generation.

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31. (Original) The electronic device of claim 28, wherein said electronic device is a telephone.

32. (Original) The electronic device of claim 28, wherein said electronic device is a computer.

33. (Original) The electronic device of claim 28, wherein said executable code comprises a Java Virtual Machine.

34. (Original) The electronic device of claim 28, wherein said executable code comprises a compiler.


Conclusion

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Paul W. Schlie whose telephone number is 571-272-6765. The examiner can normally be reached on Mon-Thu 8:00-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Kim can be reached on 517-272-4182. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.


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PRIMARY EXAMINER
6/11/06